ANNUAL REPORT

Iowa Highway Research Board
Research and Development Activities
FY 2017

DECEMBER 2017

ANNUAL REPORT
OF
IOWA HIGHWAY RESEARCH BOARD
RESEARCH AND DEVELOPMENT ACTIVITIES

FOR THE
FISCAL YEAR ENDING JUNE 30, 2017

OFFICE OF RESEARCH AND ANALYTICS
(515) 239-1382
www.iowadot.gov/RA

STRATEGIC PERFORMANCE DIVISION
IOWA DEPARTMENT OF TRANSPORTATION
AMES, IOWA 50010

DECEMBER 2017

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LIST OF ACRONYMS

AASHTO - American Association of State Highway and Transportation Officials
APWA - American Public Works Association
ASCE - American Society of Civil Engineers
DOT - Department of Transportation
FHWA - Federal Highway Administration
GIS - Geographic Information System
HMA - Hot Mix Asphalt
HPC – High Performance Concrete
IHRB - Iowa Highway Research Board
ISU - Iowa State University
LiDAR – Light Detection and Ranging
LRFD - Load and Resistance Factor Design
LTAP - Local Technical Assistance Program
LVR - Low Volume Road
MOVITE - Missouri Valley Section of the Institute of Transportation Engineers
NCHRP - National Cooperative Highway Research Program
STIC – Statewide Transportation Innovation Council
SUDAS - Statewide Urban Designs and Specifications
TAC - Technical Advisory Committee
TRB - Transportation Research Board
UHPC - Ultra High Performance Concrete
USGS - United States Geological Survey
WMA – Warm Mix Asphalt
SPR - Statewide Planning and Research
AADT - Annual Average Daily Traffic
RFIDS – Motion Sensing Radio Transponders
CBM – Condition-Based Maintenance
MEMS – Micro Electra Mechanical Sensor
LRFR – Load and Resistance Factor Rating
RCB – Reinforced Concrete Box
QA – Quality Assurance
DNR – Department of Natural Resources
FWD – Falling Weight Deflectometer
DCP – Dynamic Cone Penetrometer
NBIS – National Bridge Inspection Standards
OBS – Office of Bridges and Structures
BEC – Bridge Engineering Center
BBR – Bending Beam Rheometer
LOS – Level of Service
VE – Viscoelastic
FEA – Finite Element Analysis
LRFR – Load and Resistance Factor Rating
STIC – State Transportation Innovation Council

RESEARCH AND DEVELOPMENT

The Iowa DOT's Research section is dedicated to *driving a quality research program that delivers targeted solutions for Iowa's transportation future.*

This report, entitled "Iowa Highway Research Board Research and Development Activities FY2017" is submitted in compliance with Sections 310.36 and 312.3A, Code of Iowa, which direct the submission of a report of the Secondary Road Research Fund and the Street Research Fund, respectively. It is a report of the status of research and development projects in progress on June 30, 2017. It is also a report on projects completed during the fiscal year beginning July 1, 2016 and ending June 30, 2017. Detailed information on each of the research and development projects mentioned in this report is available from the Office of Research and Analytics, Performance and Technology Division, Iowa Department of Transportation.

THE IOWA HIGHWAY RESEARCH BOARD

In developing a progressive, continuing, and coordinated program of research and development, the Iowa DOT is assisted by the IHRB. This advisory group was established in 1949 by the Iowa State Highway Commission to respond to the research denoted in Sections 310.36 and 312.3A of the Code of Iowa.

The Research Board consists of 15 regular members: seven Iowa county engineers, four Iowa DOT engineers, one representative from Iowa State University, one from The University of Iowa, and two engineers employed by Iowa municipalities. Each regular member may have an alternate who will serve at the request of the regular member. The regular members and their alternates are appointed for a three year term. The membership of the Research Board for FY17 is listed in Table I and II.

The Research Board held several regular meetings during the period from July 1, 2016, through June 30, 2017. Suggestions for research and development were reviewed at these meetings and recommendations were made by the Board.

IHRB
IOWA HIGHWAY RESEARCH BOARD

Members of the IHRB are serious about the future of transportation. Understanding that every research project has the potential to strengthen the infrastructure and save lives, time, and precious resources, they work hard to make sure new methods, technologies, and materials are developed efficiently and economically for application in the real world. **The IHRB has received national attention as a leader in transportation research implementation.**

Table I - 2016 IOWA HIGHWAY RESEARCH BOARD

Member	Term Expires	Alternate
Ahmad Abu-Hawash Chief Structural Engineer Iowa DOT - Bridges and Structures 800 Lincoln Way Ames, IA 50010 (515) 239-1393 Email: Ahmad.Abu-hawash@dot.iowa.gov	12-31-18	Dave Claman Preliminary Bridge Engineer Iowa DOT - Bridges and Structures 800 Lincoln Way Ames, IA 50010 (515) 239-1487 Email: David.Claman@dot.iowa.gov
Kevin Jones Materials Testing Engineer Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1237 Email: Kevin.Jones@dot.iowa.gov	12-31-18	Scott Schram Bituminous Materials Engineer Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1604 Email: Scott.Schram@dot.iowa.gov
Michael Kennerly Director of Design Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1243 Email: Michael.Kennerly@dot.iowa.gov	12-31-16	Chris Poole Safety Programs Engineer Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1267 Email: Chris.Poole@dot.iowa.gov
Tammy Nicholson Director of Office of Rail Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1052 Email: Tamara.Nicholson@dot.iowa.gov	12-31-17	Dan Sprengeler Work Zone Traffic Control Engineer Office of Traffic and Safety 800 Lincoln Way Ames, IA 50010 (515) 239-1823 Email: Dan.Sprengeler@dot.iowa.gov
Sarah Okerlund, Chair Civil Engineer II, City of Ankeny 220 W 1st St Ankeny, IA 50023-1751 (515) 963-3526 Email: sokerlund@ankenyiowa.gov	12-31-17	Matt Cox City Engineer, City of Council Bluffs 209 Pearl Street Council Bluffs, IA 51503-0826 (712) 328-4635 Email: mcox@councilbluffs-ia.gov
Ronald Knoche Director of Public Works 410 E. Washington Street Iowa City, IA 52240-1825 (319) 356-5138 Email: Ron-Knoche@iowa-city.org	12-31-18	Bruce Braun Street Maintenance Administrator 216 SE 5th Street Des Moines, IA 50309 (515) 237-1371 Email: BABraun@dmgov.org
Paul Hanley The University of Iowa – CEE 4105 Seamans Center Iowa City, IA 52242 (319) 335-8137 Email: paul-hanley@uiowa.edu	----------	

Wade Weiss Greene County Engineer 114 N. Chestnut Street Jefferson, IA 50129 (515) 386-5650 Email: wweiss@co.greene.ia.us	----------	
Russ Stutt Jasper Co Secondary Road Department 910 N. 11th Ave. E. Newton, IA 50208 (641) 792-5862 Email: rstutt@co.jasper.ia.us	12-31-17 District 1	Paul Geilenfeldt III Marshall Co Engineers Office 101 East Church Street Marshalltown IA 50158-4915 (641)-754-6343 Email: pgeilenfeldt@co.marshall.ia.us
Doug Miller Kossuth Co. Secondary Road Dept. 114 W State Street Algona, IA 50511 (515) 295-3320 Email: engineer@co.kossuth.ia.us	12-31-16 District 2	Lee Bjerke Winneshiek County Engineers Office 201 W Main St Decorah, IA 52101-1713 (563) 382-2951 Email: lbjerke@co.winneshiek.ia.us
Paul Assman Crawford County Engineer 1202 Broadway, PO Box 458 Denison, IA 51442 (712) 263-2449 Email: passman@crawfordcounty.org	12-31-16 District 3	Scott Rinehart Clay County Engineers Office 300 W 4th St #5 Spencer, IA 51301-3806 (712) 262-2825 Email: srinehart@co.clay.ia.us
Kevin Mayberry Mills County Engineers Office 403 Railroad Avenue Glenwood, IA 51534 (712) 527-4873 Email: kmayberry@millscoia.us	12-31-17 District 4	Brad Skinner Montgomery County Engineers Office 406 West 4th Street Red Oak, IA 51566-0095 (712) 623-5197 Email: bskinner@montgomerycoia.us
Larry Roehl Louisa County Engineer 8313 K. Avenue Wapello, IA 52653-9279 (319) 523-5272 Email: LRoehl.locoe@louisacomm.net	12-31-16 District 5	Jacob Thorius Washington County Engineers 210 W Main St., Ste. 2 Washington, IA 52353-1723 (319) 653-7731 Email: thorius@co.washington.ia.us
Myron Parizek Benton County Engineer 1707 W 1st St Vinton, IA 52349 (319) 472-2211 Email: mparizek@co.benton.ia.us	12-31-18 District 6	Todd Kinney Clinton County Engineer 1900 N 3rd Street Clinton, IA 52733-2957 (563) 244-0564 Email: tkinney@clintoncounty-ia.gov
Terry Wipf Dept. of CCEE Engineering ISU 420 Town Engineering Bldg. Ames, IA 50010 (515) 294-6979 Email: TJWipf@iastate.edu	----------	

Table II - 2017 IOWA HIGHWAY RESEARCH BOARD

Member	Term Expires	Alternate
Ahmad Abu-Hawash, Chair Chief Structural Engineer, Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1393 Ahmad.Abu-hawash@iowadot.us	12/31/2018	Dave Claman Preliminary Bridge Engineer, Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1487 David.Claman@iowadot.us
Kevin Jones Materials Testing Engineer, Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1237 Kevin.Jones@iowadot.us	12/31/2018	Chris Brakke Pavement Management Engineer 800 Lincoln Way Ames, IA 50010 (515) 239-1882 Chris.Brakke@iowadot.us
Chris Poole Safety Programs Engineer, Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1267 Chris.Poole@iowadot.us	12/31/2019	Khyle Clute Methods Transportation Engineer 800 Lincoln Way Ames, IA 50010 (515) 239-1862 Khyle.Clute@iowadot.us
Tammy Nicholson Director, Office Location & Environment, Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1052 Tamara.Nicholson@iowadot.us	12/31/2017	Dan Sprengeler Work Zone Traffic Control Engineer, Iowa DOT 800 Lincoln Way Ames, IA 50010 (515) 239-1823 Dan.Sprengeler@iowadot.us
Sarah Okerlund, Civil Engineer II, City of Ankeny 220 W 1st St Ankeny, IA 50023-1751 (515) 963-3526 sokerlund@ankenyiowa.gov	12/31/2017	Matt Cox City Engineer, City of Council Bluffs 209 Pearl Street Council Bluffs, IA 51503-0826 (712) 328-4635 mcox@councilbluffs-ia.gov
Ronald Knoche Director of Public Works, Iowa City 410 E. Washington Street Iowa City, IA 52240-1825 (319) 356-5138 Ron-Knoche@iowa-city.org	12/31/2018	Bruce Braun Street Maintenance Administrator, Des Moines 216 SE 5th Street Des Moines, IA 50309 (515) 237-1371 BABraun@dmgov.org
Paul Hanley The University of Iowa – Dept. of CEE 4105 Seamans Center Iowa City, IA 52242 (319) 335-8137 paul-hanley@uiowa.edu	----------	
Terry Wipf Iowa State University, Dept. of CCEE 420 Town Engineering Bldg. Ames, IA 50011 (515) 294-6979 TJWipf@iastate.edu	----------	

Wade Weiss Greene County Engineer 114 N. Chestnut Street Jefferson, IA 50129 (515) 386-5650 wweiss@co.greene.ia.us	---------- TRB Rep	
Russ Stutt Jasper Co Secondary Road Department 910 N. 11th Ave. E. Newton, IA 50208 (641) 792-5862 rstutt@co.jasper.ia.us	12/31/2017 District 1	Paul Geilenfeldt III Marshall Co Engineers Office 101 East Church Street Marshalltown, IA 50158-4915 (641)-754-6343 pgeilenfeldt@co.marshall.ia.us
Lee Bjerke Winneshiek County Engineers Office 201 W Main St Decorah, IA 52101-1713 (563) 382-2951 lbjerke@co.winneshiek.ia.us	12/31/2019 District 2	Joel D. Fantz Fayette County Engineers Office 114 N. Vine Street West Union, IA 52175 (563) 422-3552 jfantz@co.fayette.ia.us
Paul Assman Crawford County Engineer 1202 Broadway, PO Box 458 Denison, IA 51442 (712) 263-2449 passman@crawfordcounty.org	12/31/2018 District 3	Brandon Billings Cherokee County Engineer 5074 Highway 3 Cherokee, IA 51012-7229 (712)-225-6712 bbillings@co.cherokee.ia.us
Kevin Mayberry Mills County Engineers Office 403 Railroad Avenue Glenwood, IA, 51534 (712) 527-4873 kmayberry@millscoia.us	12/31/2017 District 4	Brad Skinner Montgomery County Engineers Office 406 West 4th Street Red Oak, IA 51566-0095 (712) 623-5197 bskinner@montgomerycoia.us
Jacob Thorius Washington County Engineers Office 210 W Main St., Ste. 2 Washington, IA, 52353-1723 (319) 653-7731 thorius@co.washington.ia.us	12/31/2019 District 5	Andrew McGuire Keokuk County Engineer 101 S. Main Sigourney, Iowa 52591 (641) 622-2610 engineer@keokukcountyia.com
Myron Parizek Benton County Engineer 1707 W 1st St | PO Box 759 Vinton, IA 52349 (319) 472-2211 mparizek@co.benton.ia.us	12/31/2018 District 6	Todd Kinney Clinton County Engineer 1900 N 3rd Street Clinton, IA 52733-2957 (563) 244-0564 tkinney@clintoncounty-ia.gov

RESEARCH AND DEVELOPMENT PROJECTS

Proposals for research and development are reviewed by the Iowa Highway Research Board. Expenditure of research and development funds are then authorized on an individual project basis.

These expenditures may be charged to the Primary Road Research Fund, Secondary Road Research Fund or the Street Research Fund, or a combination and the costs are shared.

Table III is a record of expenditures for IHRB Projects made during the fiscal year ending June 30, 2017. Total expenditure was $1,396,128.67.

TABLE III
FINANCIAL SUMMARY OF RESEARCH AND DEVELOPMENT PROJECT EXPENDITURES

July 1, 2016 to June 30, 2017
(Active projects with no current fiscal year expenditures are not included)

Project #	Project Title	Primary Road Research Fund Expenditures	Secondary Road Research Fund Expenditures	Street Research Fund Expenditures	Total Expenditures
HR140	Collection & Analysis of Streamflow Data	155,670.00	-	26,034.00	181,704.00
HR296	ISU Local Technical Assistance Program (LTAP)	62,460.54	78,075.70	15,615.13	156,151.37
TR637	Development of a Wireless MEMS Multifunction Sensor System and Field Demonstration of Embedded Sensors for Monitoring Concrete Pavements	25,951.06	-	-	25,951.06
TR655	Updating the Iowa Culvert Hydraulics and Iowa Bridge Backwater Software	-	9,279.00	-	9,279.00
TR665	Mitigation of Sedimentation at Multi-Box Culverts	14,526.74	41,816.50	8,363.30	64,706.54
TR673	Design and Performance Verification of a Bridge Column/Footing/Pile System for Accelerated Bridge Construction (ABC)	-	43,368.35	522.62	43,890.97
TR674	Evaluation of Otta Seal Surfacing for Low-Volume Roads in Iowa	-	3,014.49	-	3,014.49
TR676	Impacts of Internally Cured Concrete Paving on Contraction Joint Spacing	-	26,627.84	-	26,627.84
TR679	Upgrading Bridge Rails on Low Volume Roads in Iowa	-	-	1,717.49	1,717.49
TR682	Standard for Single Span Prefabricated Bridges-Phase III	-	25,642.13	36,117.67	61,759.80
TR683	Bridge Workshop - Use of Ultra-High Performance Concrete for Bridges	1,637.19	2,657.07	-	4,294.26
TR684	Laboratory and Field Evaluation of an Alternative UHPC Mix and an Associated UHPC Bridge	-	22,522.10	-	22,522.10
TR685	Feasibility of Gravel Road and Shoulder Recycling	14,419.32	45,345.32	-	59,764.64
TR686	Guidance on Traffic Sign Effectiveness, Installation, and removal	-	20,651.04	7,500.00	28,151.04
TR691	Cost-Competitive Timber Bridge Designs for Long Term Performance	50.70	-	-	50.70

TR692	Investigation of Stream-Channel and Watershed Delineations and Basin-Characteristic Measurements using LiDAR Data for Small Drainage Basins in Iowa Located Within the Des Moines Lobe Landform Region	-	42,415.37	6,203.51	48,618.88
TR695	Evaluation of Rural Intersection Treatments	32,000.00	40,000.00	2,037.69	74,037.69
TR696	Installation Guidance for Centerline and Edgeline Rumble Strips in Narrow Pavements		-	5,674.06	5,674.06
TR697	Prevention and Restoration of Early Joint Deterioration	15,138.95	37,276.00	5,311.22	57,726.17
TR698	Concrete Overlay Performance on Iowa's Roadways	40,758.49	25,307.55	-	66,066.04
TR699	Real-time Flood Forecasting and Monitoring Systems for Highway Overtopping in Iowa	10,617.14	90,717.99	-	101,335.13
TR700	Prevention of Longitudinal Cracking in Iowa Widened Concrete Pavement	9,926.29	-	-	9,926.29
TR701	Evaluation of the Use of Link Slabs in Bridge Projects	6,512.34	-	-	6,512.34
TR702	Transportation Research Board Education for City Engineers	-	-	1,632.79	1,632.79
TR703	Update Depth of Cover Tables for Concrete and Corrugated Pipe	9,193.64	26,811.00	3,062.79	39,067.43
TR704	Performance Based Evaluation of cost Effective Aggregate Options for Granular Roadways	59,948.86	1,618.94	-	61,567.80
TR709	Effectiveness of Pavement Preservation Techniques	26,104.70	-	-	26,104.70
TR710	Partially Grouted Revetment for Low Volume Road Bridges	13,198.59	-	-	13,198.59
TR711	Investigation of Exterior Girder Rotation and the Effect of Skew during Deck Placement	10,964.56	-	-	10,964.56
TR712	Evaluate, Modify and Adapt the Concrete Works Software for Iowa's Use	51,710.73	-	-	51,710.73
TR713	Load Rating of Standard Bridges for Special Hauling Vehicles (SHV)	36,378.00	45,472.00	8,502.00	90,352.00
TR714	Guide to Life-Cycle Data and Information Sharing Workflow for Transportation Assets	8,322.82	-		8,322.82
TR715	Beam End Repair for Pre-Stressed Concrete Beams	8,642.51	-		8,642.51
TR717	Use of Polymer Overlays or Sealers on New Bridges	10,000.00	2,715.00		12,715.00
TR718	Evaluation of Alternative Abutment Piling for Low Volume Road Bridges	4,141.96	-		4,141.96
TR721	Low-cost Rural Surface Alternatives Phase III	4,294.08	-		4,294.08
TR725	Low-Cost Rural Surface Alternatives Phase IV: Forst Depth Monitoring and Prediction	3,931.80	-		3,931.80
	Project Total	636,501.01	631,333.39	128,294.27	1,396,128.67

SECONDARY ROAD RESEARCH FUND

Section 310.34 of the Iowa Code authorizes the Iowa Department of Transportation to set aside each year an amount not to exceed 1½% of the receipts to the Farm-to-Market Fund in a fund to be known as the Secondary Road Research Fund. This authorization was first made in 1949; it was repealed in 1963, and reinstated in 1965. When the fund was reinstated, the fund was designated to finance engineering studies and research projects. The Iowa Department of Transportation accounting procedure for the Secondary Road Research Fund is based on obligations for expenditures on research projects and not the actual expenditures.

The fiscal year 2017 financial summary is:

Beginning Balance 7-1-16		$ 1,707,519.34
Receipts		
State Road Use Tax Fund		
(1½% of receipts)	$ 1,634,497.97	
Federal Aid Secondary		
(1½% of receipts)	0.00	
Research Income	$ 0.00	
Sub-Total		$1,634,497.97
Total Funds Available		$3,342,017.31
Obligation for Expenditures		
Obligated for		
Contract Research	$1,630,728.09	
Non-Contract		
Engineering Studies	$ 0.00	
Total Expenditures		$1,630,728.09
Ending Balance 6-30-17		$1,711,289.22

STREET RESEARCH FUND

The Street Research Fund was established in 1989 under Section 312.3A of the Iowa Code. Each year $200,000 is set aside from the street construction fund for the sole purpose of financing engineering studies and research projects. The objective of these projects is more efficient use of funds and materials available for construction and maintenance of city streets. The Iowa Department of Transportation accounting procedure for the Street Research Fund is based on obligations for expenditures on research projects and not the actual expenditures. The fiscal year 2017 financial summary is:

Beginning Balance (7-1-16)	$121,413
De-obligated (Unused) Funds from Previous Projects	$10,540
FY17 Street Research Funding	$200,000
Total Funds Available for Street Research	$331,953
Total Obligated for Expenditure FY17	($310,432)
Ending Unobligated Balance 6-30-17	$13,511

PRIMARY ROAD RESEARCH FUND

The Primary Road Research Fund is sourced from non-obligated funds of the Primary Road Fund. These funds can only be expended on projects for which the funds were reserved, such as contracted research and project-specific research supplies or equipment. An estimate of Primary Road Research Fund expenditures is made prior to the beginning of each fiscal year. The amount expended for contract research from the Primary Road Research Fund for FY17 was $636,501.01 and the estimate for obligations for FY17 is $750,000.

PROJECTS INITIATED DURING FY 2017

The following projects were initiated in FY 17.

TR-702, “Transportation Research Board Education for City Engineers”

TR-714, “Life-Cycle Data for Transportation Assets”

TR-715, “Beam End Repair for Pre-Stressed Concrete Beams”

TR-716, “Construction of New Substructure Beneath Existing Bridges”

TR-717, “Use of Polymer Overlays or Sealers on New Bridges”

TR-718, “Evaluation of Alternative Abutment Piling for Low Volume Road Bridges”

TR-719, “Development of Self Cleaning Box Culvert Phase III”

TR-720, “Development of Bio-Based Polymers for use in Asphalt Phase III”

TR-721, “Low Cost Surface Alt. Phase III”

TR-722, “Increase Service Life at Bridge Ends through improved Abutment/Approach Slab Details & Water Management Practices”

TR-723, “Implementation of Negative Moment Reinforcement Detail Recommendations”

TR-724, “Self-Heated Electrically Conductive Concrete Demo Project”

TR-725, “Low-Cost Rural Surface Alt. Phase IV: Frost Depth Monitoring & Prediction”

TR-726, “Iowa TPMS (Modernization of Iowa Transportation Program Management System)”

TR-727, “Optimizing Maintenance Equipment Life Cycle for Local Agencies”

TR-728, “Role of Coarse Aggregate Porosity on Chloride Intrusion in HPC Bridge Decks”

TR-729, “Development of Granular Roads Asset Management System”

TR-730, “Advanced Testing & Characterization of Iowa Soils and Geometrics”

TR-731, “Improving Concrete Patching Practices in Iowa Roadways”

TR-732, “Develop Safety Improvements at Public Highway Railroad Grade Crossings”

20 Projects Initiated

PROJECTS COMPLETED DURING FY 2017

The following projects were presented to the Iowa Highway Research board during FY 2017 and project Final Reports were approved. Links to the available final reports are provided.

TR-637, "Development of a Wireless MEMS Multifunction Sensor System and Field Demonstration of Embedded Sensors for Monitoring Concrete Pavements" http://publications.iowa.gov/22658/

TR-644, "Development and Integration of Advanced Development of Cost-Effective Timber Bridge Repair Techniques for Minnesota Project" https://www.lrrb.org/media/reports/201545A.pdf

TR-655, "Updating the Iowa Culvert Hydraulics and Iowa Bridge Backwater Software"

TR-667, "Validation of Gyratory Mix Design in Iowa" http://publications.iowa.gov/22605/

TR-668, "Impact of Curling and Warping on Concrete Pavement" http://publications.iowa.gov/22611/

TR-679, "Upgrading Bridge Rails on Low-Volume Roads in Iowa" http://publications.iowa.gov/22592/

TR-681, "Context Sensitive Designs: Testing of Multi-Performance Level Box Beam Standards" http://publications.iowa.gov/25797/

TR-682, "Standard for Single Span Prefabricated Bridges-Phase III"

TR-686, "Guidance on Traffic Sign Effectiveness, Installation, and Removal" http://publications.iowa.gov/25795/

TR-697, "Prevention and Restoration of Early Joint Deterioration in Concrete Pavements" http://publications.iowa.gov/25794/

TR-703, "Update Depth of Cover Tables for Concrete and Corrugated Pipe" http://publications.iowa.gov/25791/

TR-713, "Load Ratings for Standard Bridges" http://publications.iowa.gov/25790/

12 Projects Completed and Approved

STATE TRANSPORTATION INNOVATION COUNCIL

Since 2015, the Iowa Highway Research Board serves as the *State Transportation Innovation Council* for the State of Iowa. The Federal Highway Administration (FHWA) *State Transportation Innovation Council* (STIC) Incentive program provides resources to help STICs foster a culture for innovation and make innovations standard practice. Through the program, funding up to $100,000 of STIC Incentive Federal Funding is awarded to the State per Federal fiscal year. This funding is available to support or offset the costs of standardizing innovative practices for Iowa's transportation agencies. STIC Incentive funding may be used to conduct internal assessments; build capacity; develop guidance, standards, and specifications; implement system process changes; organize peer exchanges; offset implementation costs; or conduct other activities the STIC identifies to address innovation implementation goals and to foster a culture for innovation or to make an innovation a standard practice in the state. The requirements for eligibility of a project or activity are:

- The project must have a statewide impact in fostering a culture for innovation or in making an innovation a standard practice.
- The project/activity for which incentive funding is requested must align with innovation goals.
- The project/activity must be eligible for Federal-aid assistance and adhere to applicable federal requirements.
- The proposed project/activity must be started as soon as practical (preferably within 6 months, but no later than 1 year) after notification of approval for STIC Incentive funding and the funds must be expended within 2 years.

The following projects have been initiated through the STIC Incentive Fund program for the State of Iowa:

2014, "Design and performance verification of a bridge column/footing/pile system for accelerated bridge construction"

2014, "Develop an implementation plan for using 3D tools for structural detailing"

2015, "Development and delivery of technical guidance and training on the implementation of a self-cleaning culvert technology"

2015, "Expand the use of mobile devices for e-Construction in field inspection applications"

2016, "Expand the use of mobile devices for e-Construction in field inspection applications"

2016, "Support for the "Innovations in Transportation Conference"

2016, "Deployment of Iowa DOT Traffic Operations Open Data Service"

2017, "In Situ Modulus Measurement Using Automated Plate Load Testing (APLT) to Support The Implementation of Pavement Mechanistic-Empirical (ME) Design"